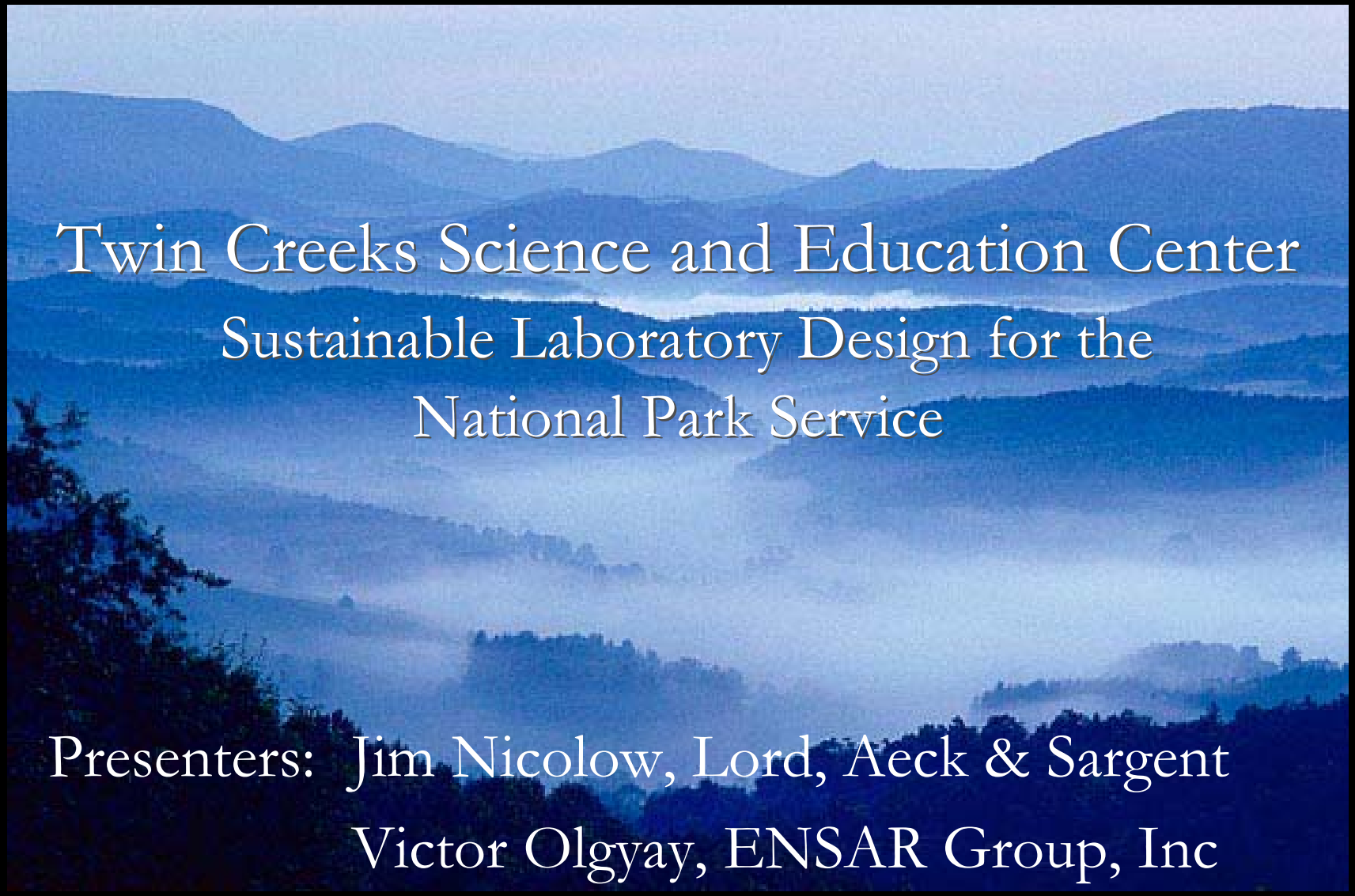
Labs21 2003 Conference



Twin Creeks Science and Education Center

Sustainable Laboratory Design for the National Park Service

Presenters: Jim Nicolow, Lord, Aeck & Sargent

Victor Olgyay, ENSAR Group, Inc

LORD · AECK · SARGENT

ARCHITECTURE

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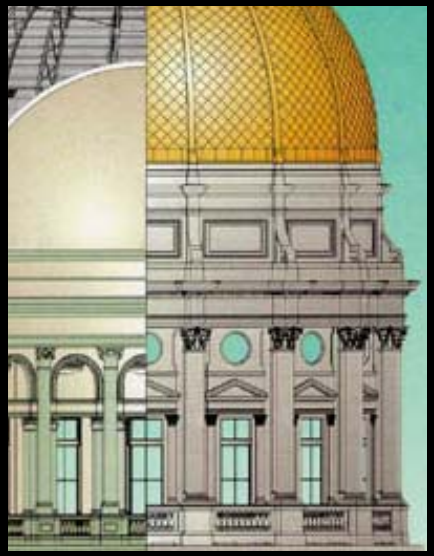
ARCHITECTURE

Education

Historic Preservation



Science

Arts & Culture

RESPONSIVE DESIGN…TECHNOLOGICAL EXPERTISE…EXCEPTIONAL SERVICE

Atlanta **Raleigh-Durham** **Ann Arbor**

www.lordaecksargent.com

Labs21 2003 CONFERENCE
Denver, Colorado

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ENSAR group

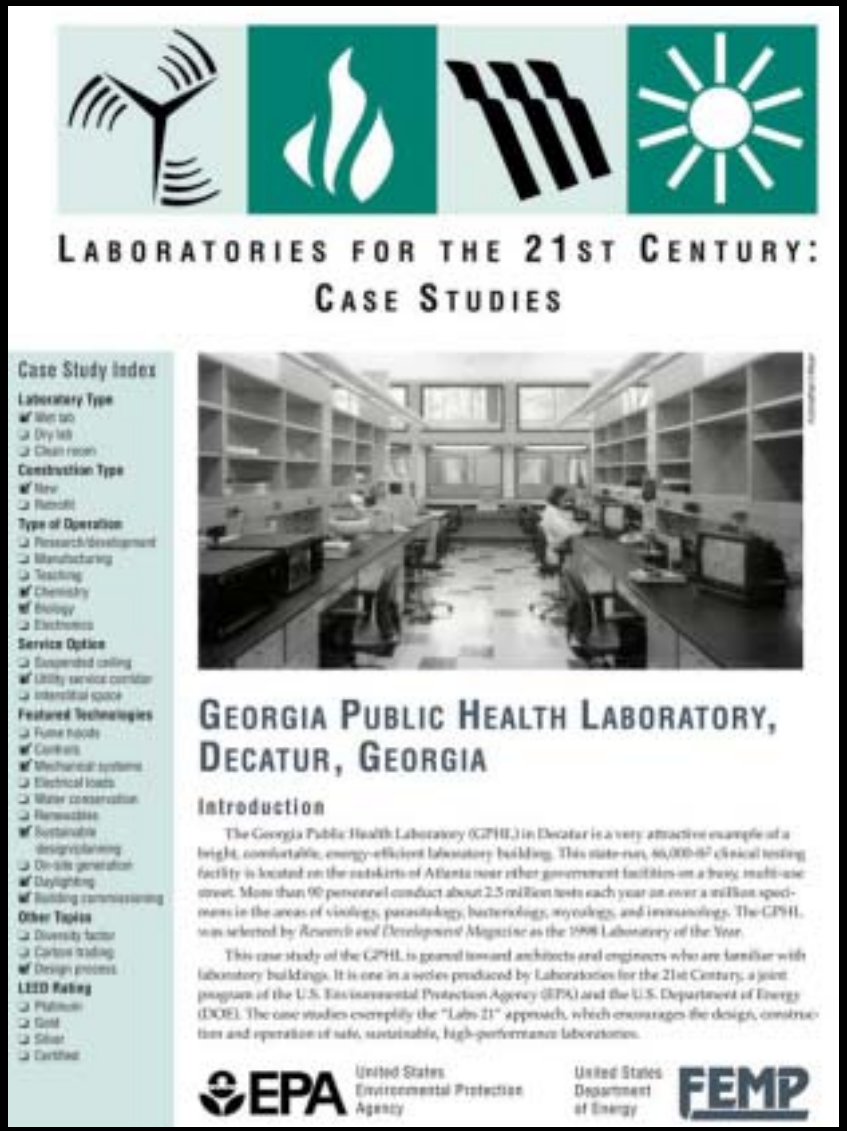
ENVIRONMENTALLY
SUSTAINABLE
ARCHITECTURE






ENSAR Group, Inc.✦ 2305 Broadway ✦ Boulder, CO 80304 ✦ 303/449-5226 tel ✦ 303/449-5276 fax ✦www.ensargroup.com

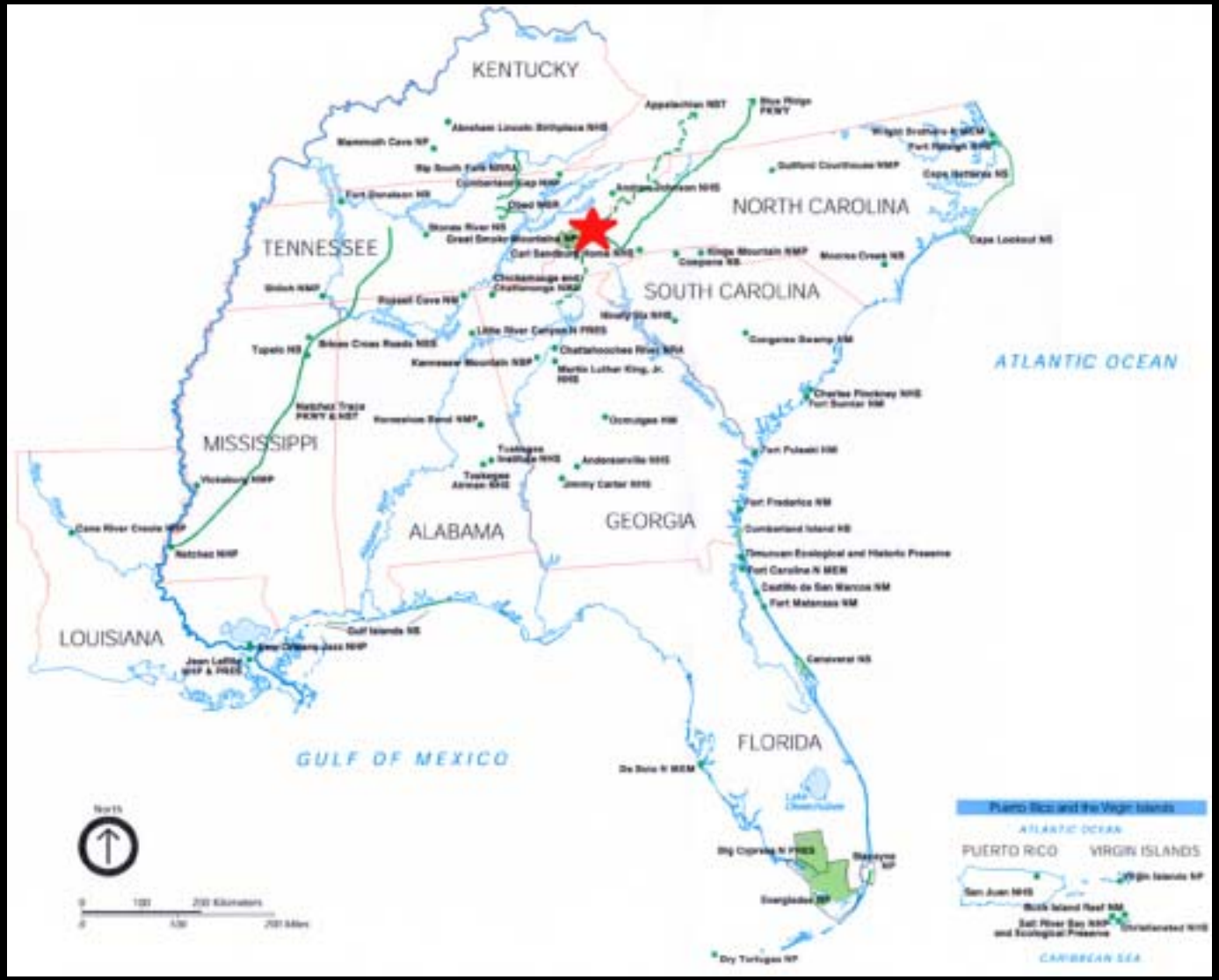
Outline



- Project Description
- Design Approach
- Technologies Used
- Commissioning
- Measurement & Evaluation
- Summary
- Questions & Answers

Project Description

Location



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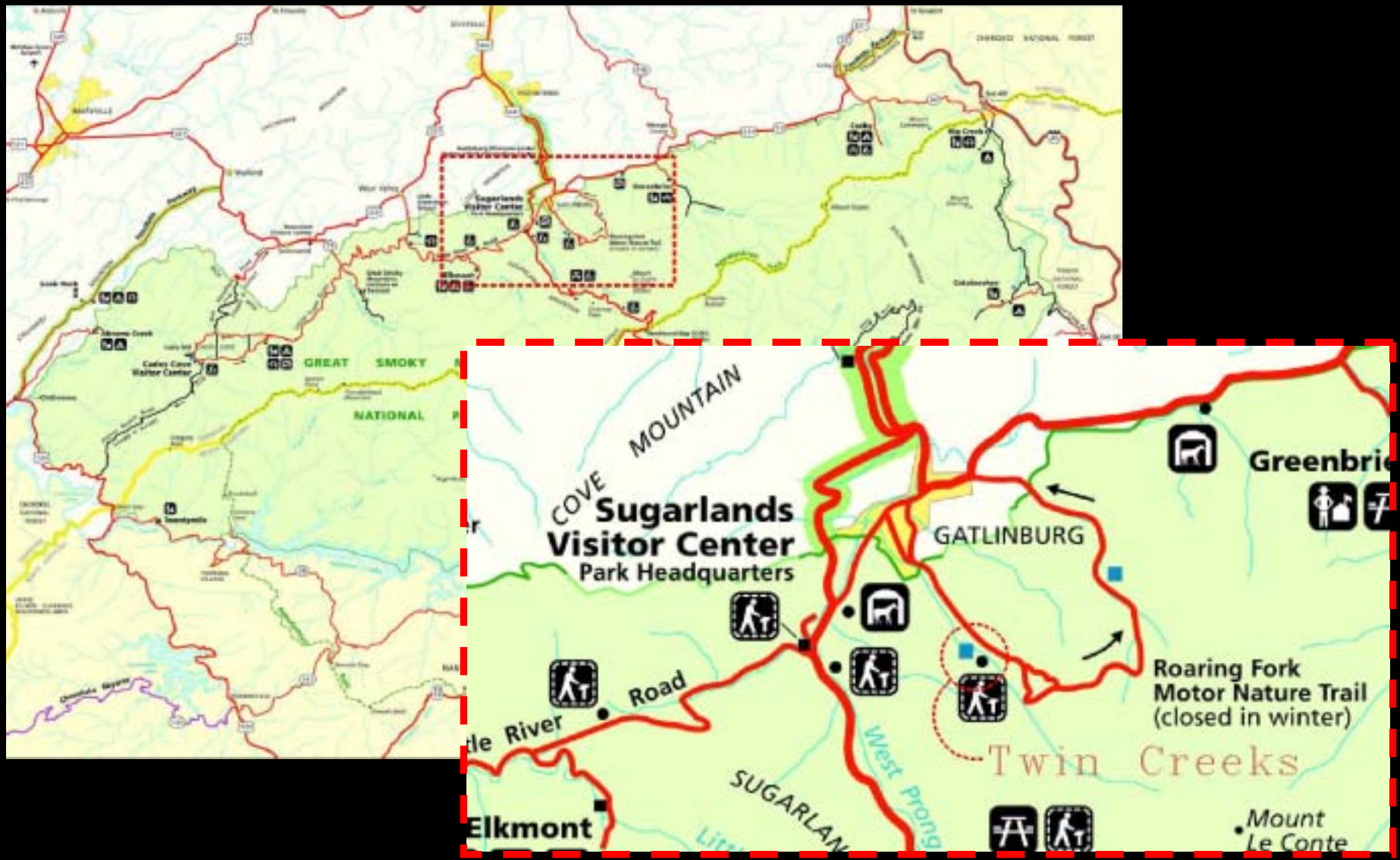
Project Description

Location



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Project Description

Site

Project Description

ATBI

- 800 sq miles
- 9,215,000 visitors
- 10,000 species
- Georgia to Maine
- 1M years glacier-free

Project Description

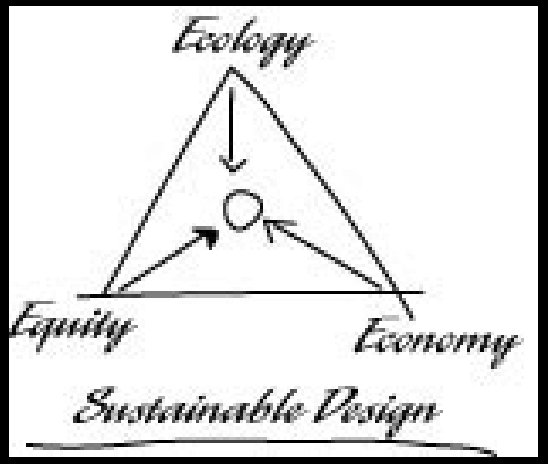
Program

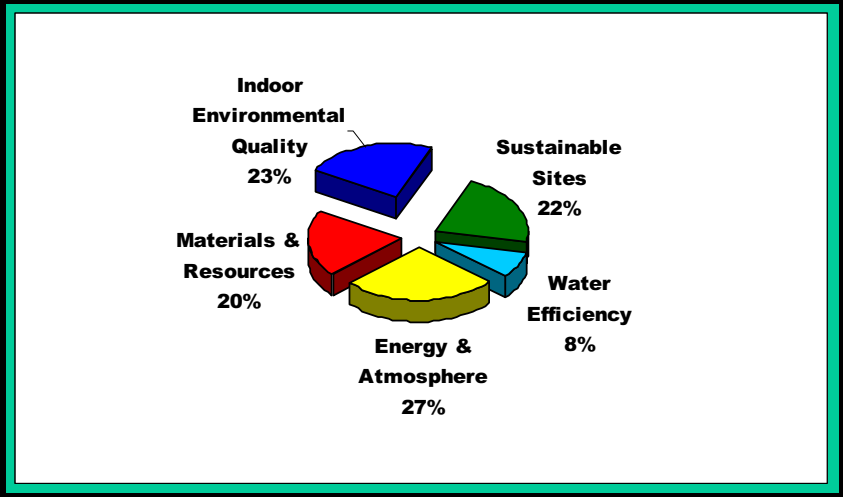
- Area: 15,000 sf
  - Specimen Curation
  - Flex Lab
  - Education
  - Researcher Offices
- Budget $4 million

Design Approach

LEED

Sustainable Design





Design Approach

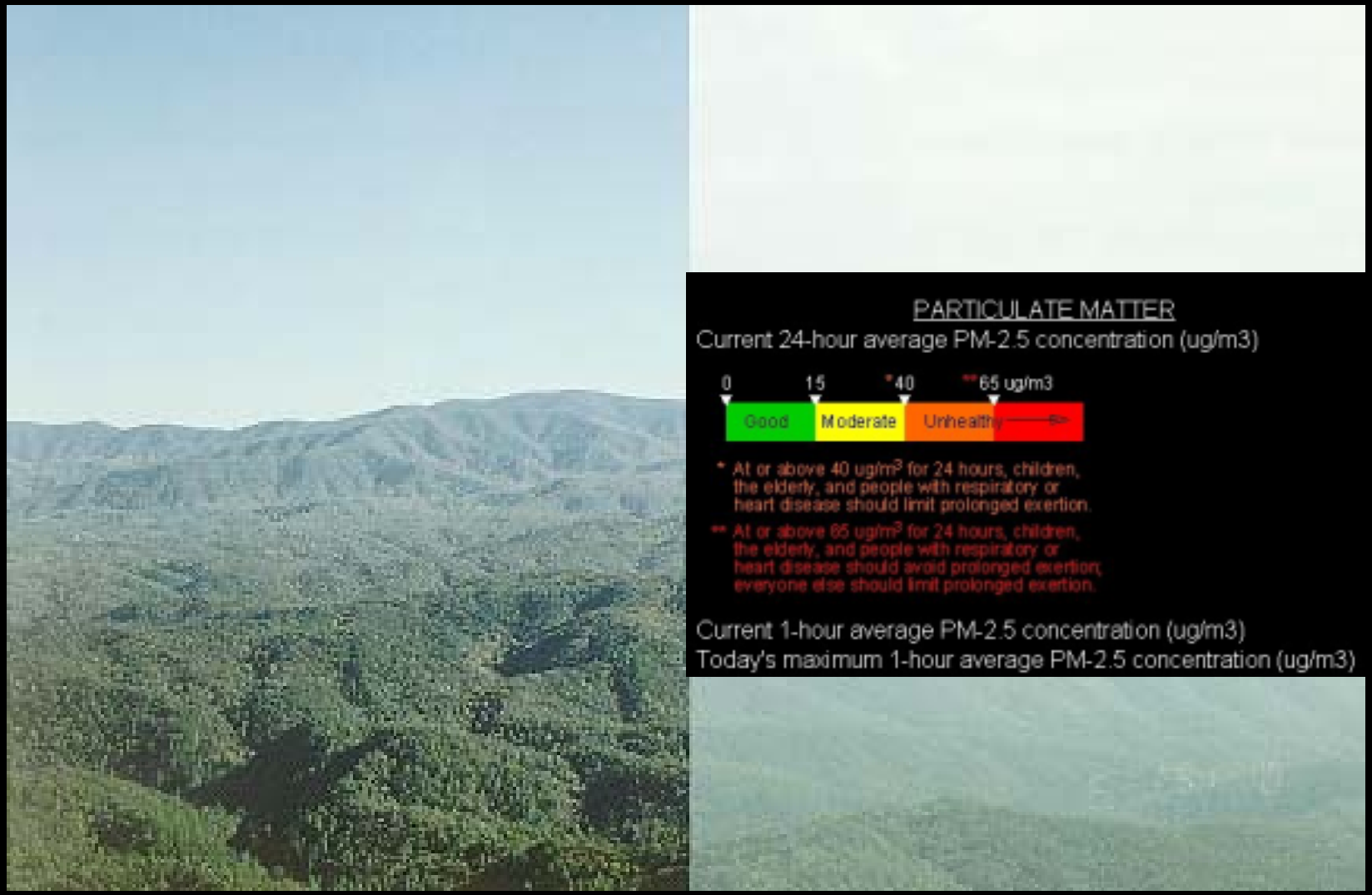
LEED

Sustainable Design

- Consistent with Labs21 Approach
  - Minimize impacts
  - Protect occupants
  - Optimize efficiency
  - Set goals, track

Design Approach Local Environment

Design Approach Local Environment



Design Approach Local Environment

Design Approach Project Goals

MISSION:
To improve protection and understanding of park resources by enhancing science-based management.

Design Approach Project Goals

Mission will be accomplished by creating a ***site sensitive***, ***sustainable facility*** that:

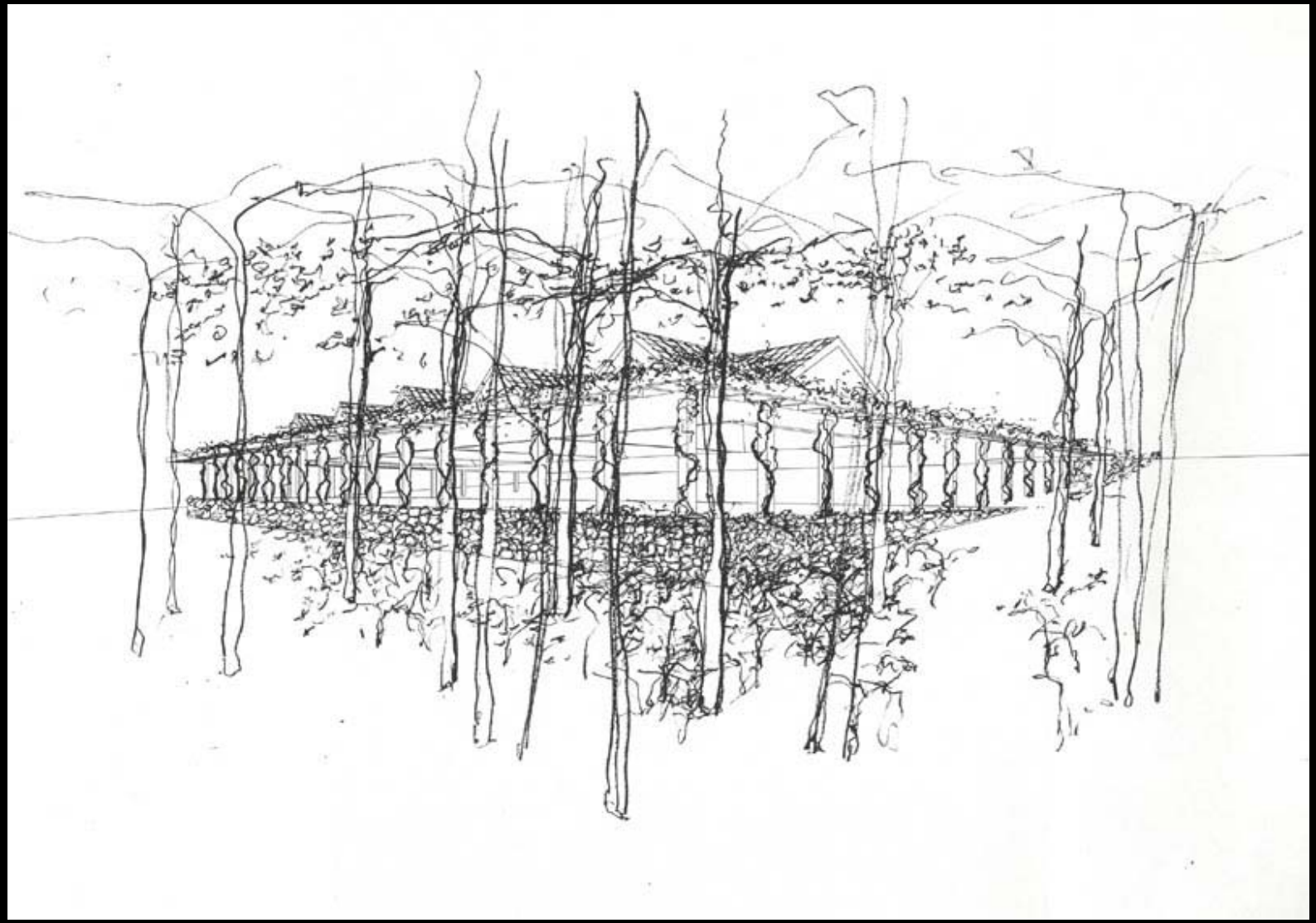
- Fosters cross-discipline intellectual exchange
- Facilitates cross-organizational partnerships
- Enhances both basic and applied research
- Encourages educational opportunities

The Result – a ***model for other resource-based science facilities***.

Design Approach Environmental Goals

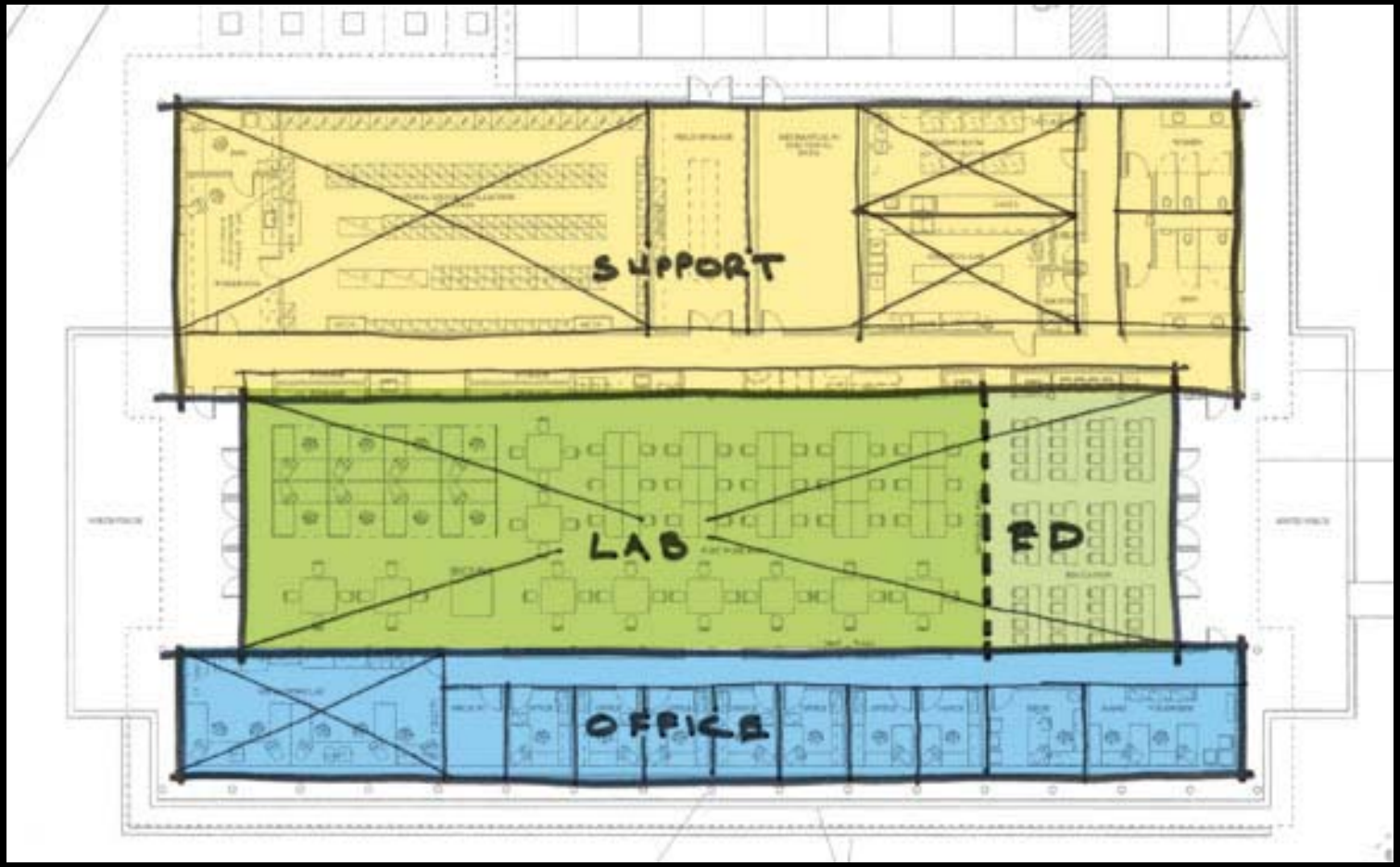
Design Approach

Site



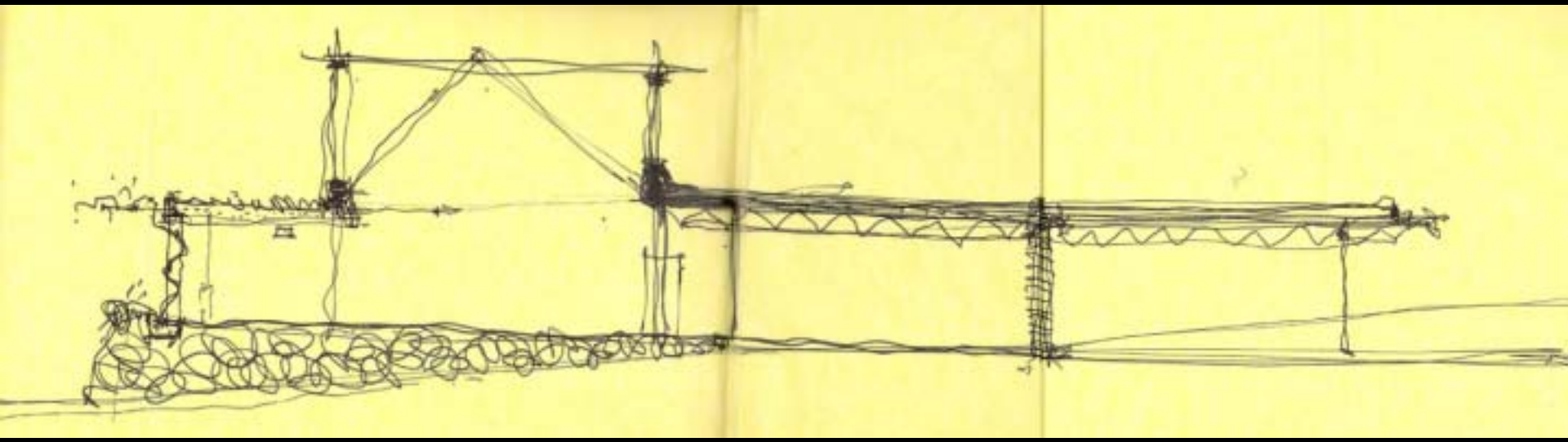
Design Approach

Plan

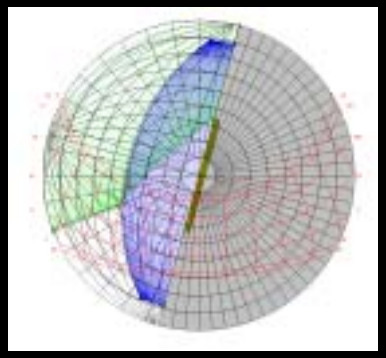


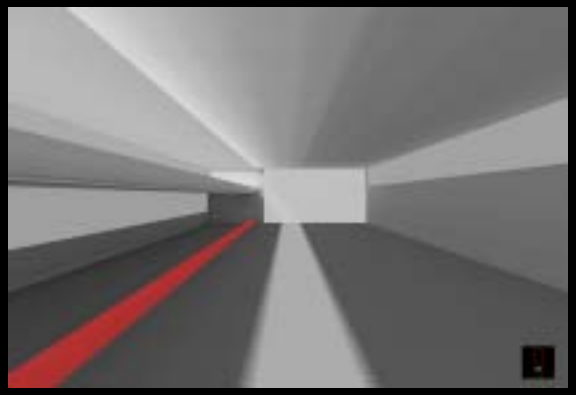
Design Approach

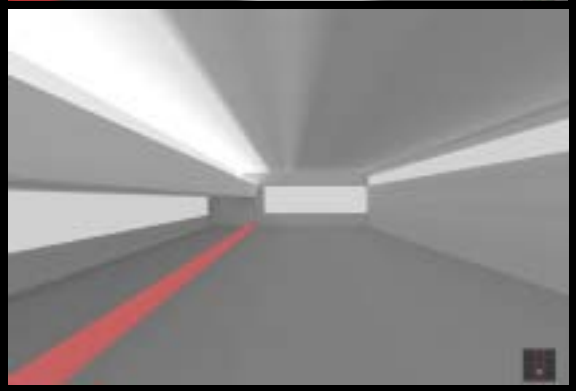
Section



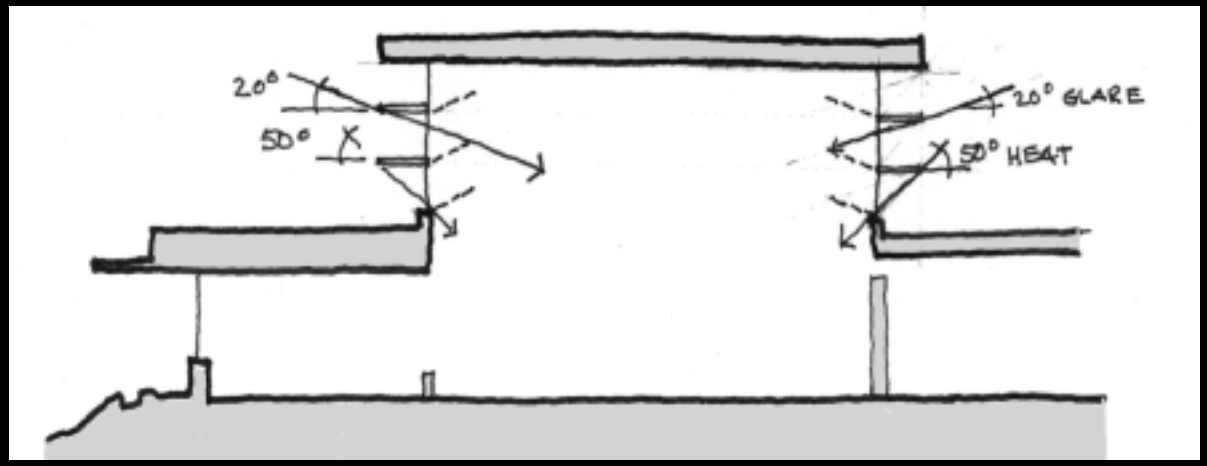
Design Approach Preliminary Design Analysis



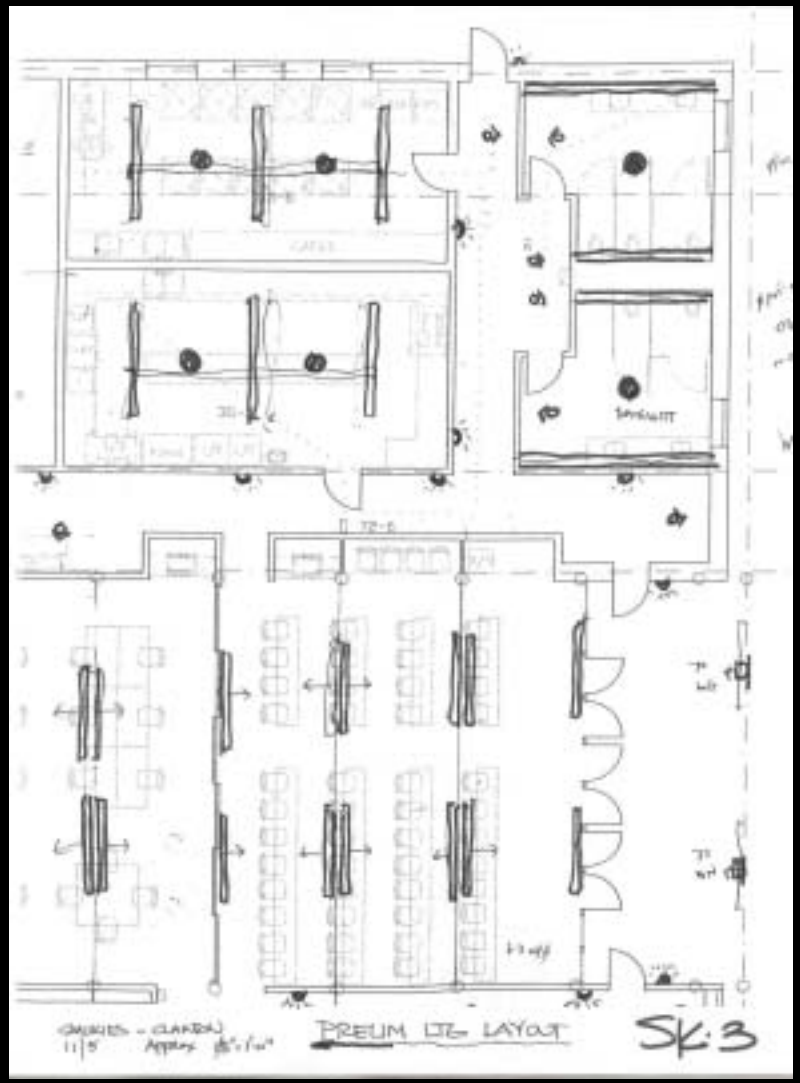




- Daylighting
  - Shading angles
  - Optimized for heat control and glare control

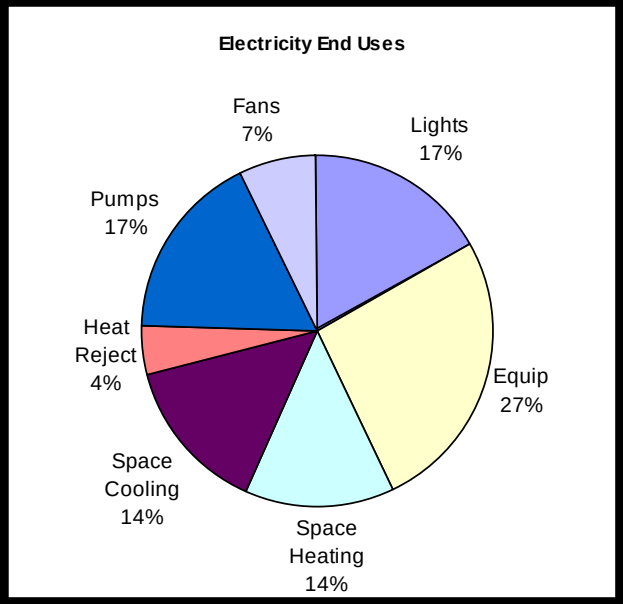


Design Approach Preliminary Design Analysis

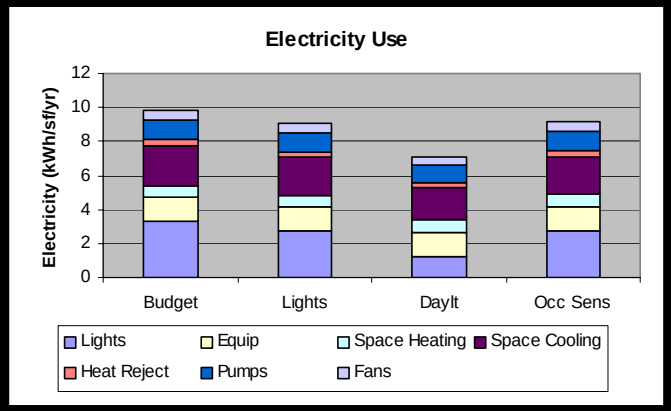


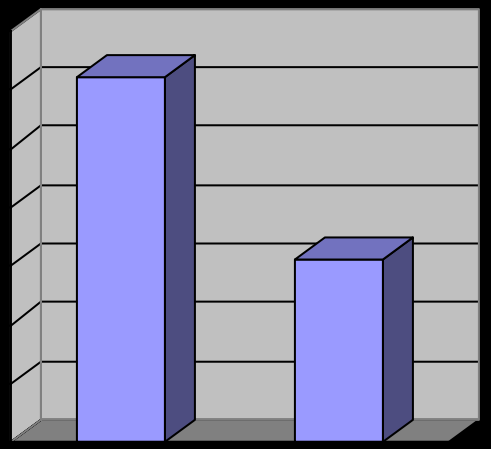
- Electric Lighting
  - Comfortable environment
  - Daylight harvesting
  - High reflectance
  - 1.0 to 1.2 w /sf
  - Peak load 50%

Design Approach Preliminary Design Analysis



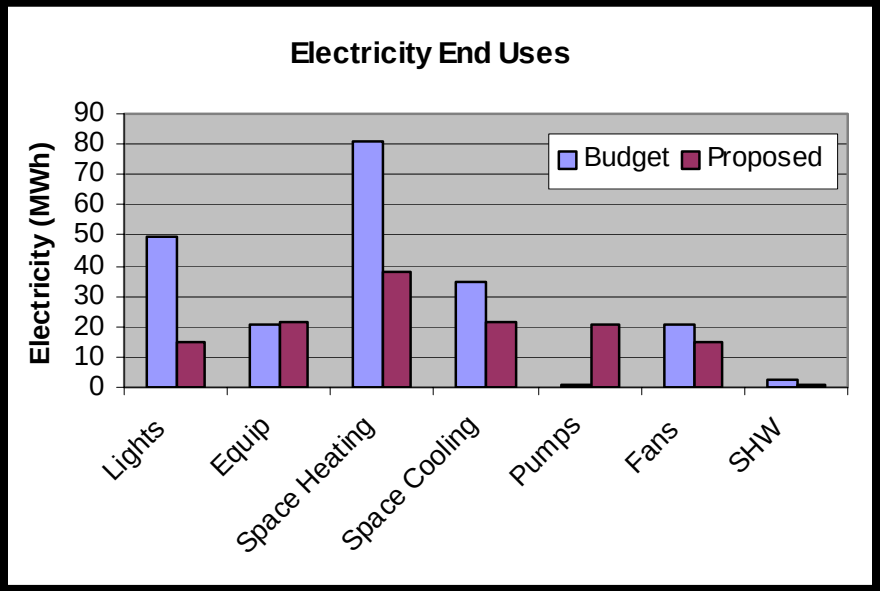
- Envelope optimization
- Parametric thermal analysis /aperture





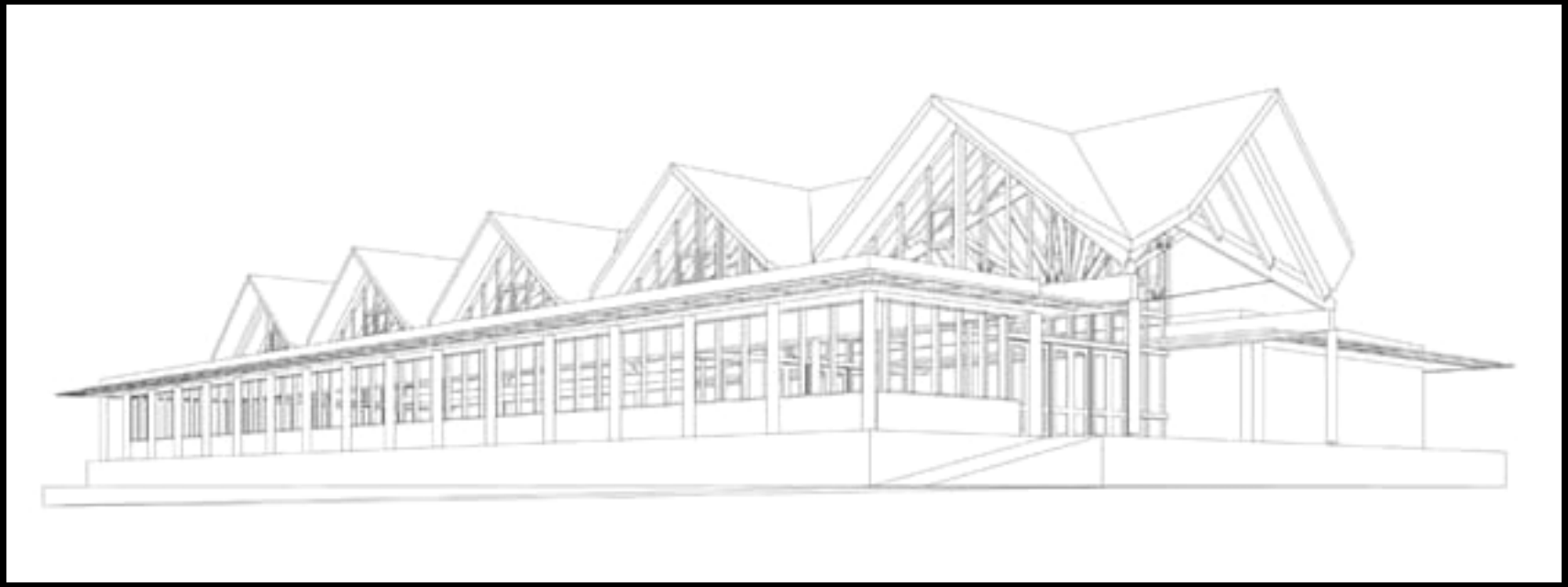
Design Approach Preliminary Design Analysis

9 Energy Efficiency Features

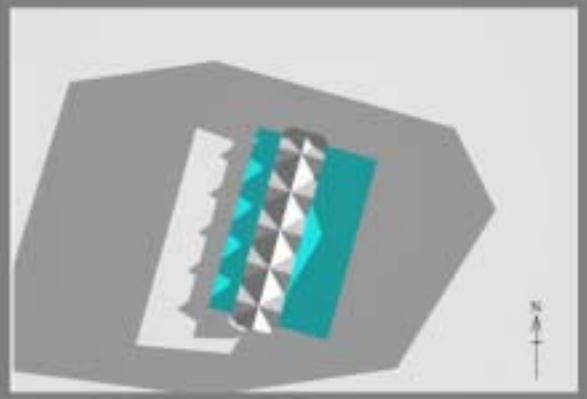


- Highly insulated roof
- High performance windows and external shading
- Energy efficient lighting
- Daylighting controls
- Occupancy sensors
- Natural ventilation
- Ground-source heat pumps
- Premium efficiency pumps and motors
- Solar hot water heating

Technologies Used Daylight Harvesting



Technologies Used Daylight Harvesting



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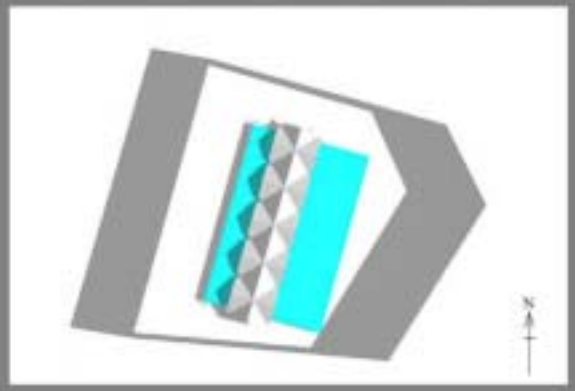
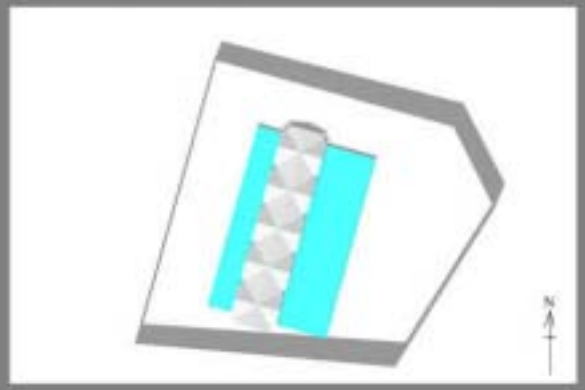
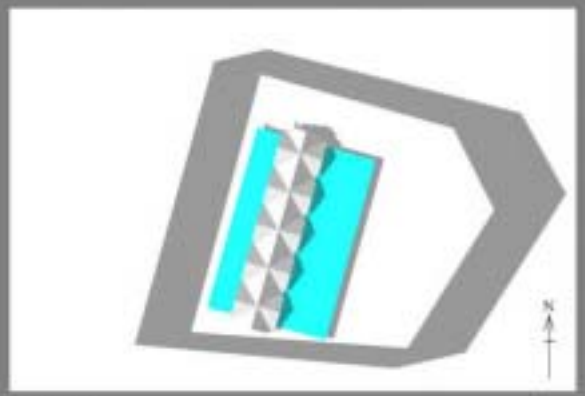


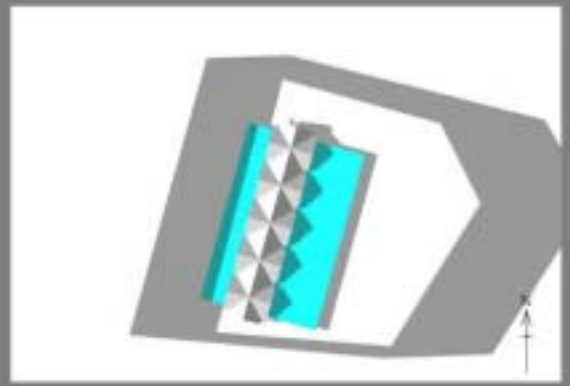
12:00pm



3:00pm



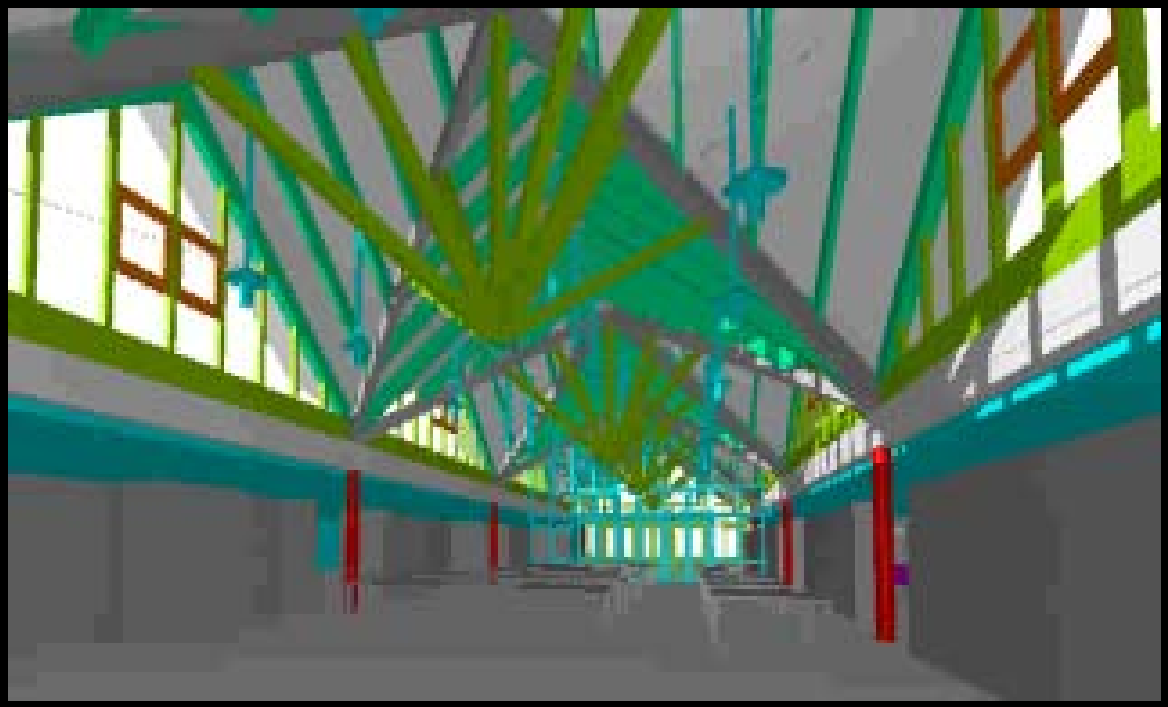
5:00pm



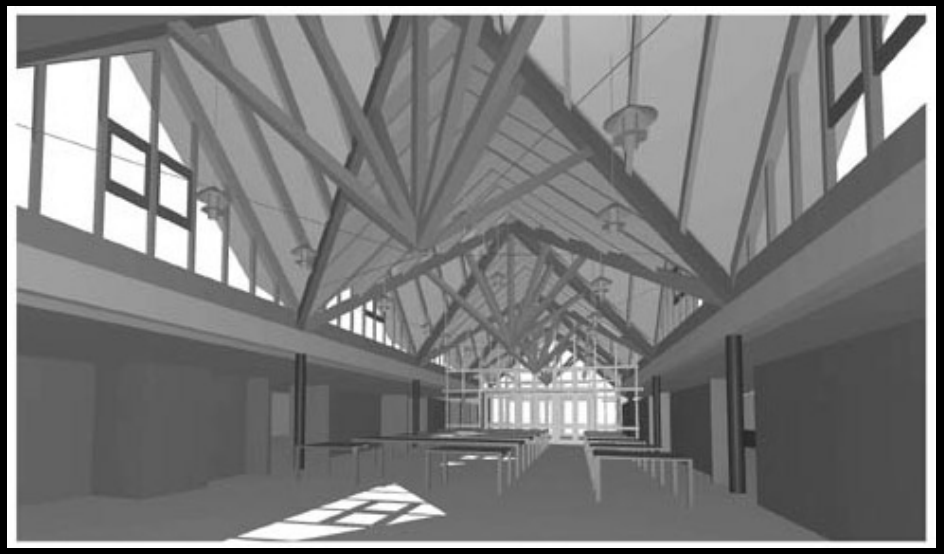
6:00pm

JUNE
Latitude:35 degress, 41 minutes north
Longgitude: 83 degrees, 32 minutes west
GMT -4

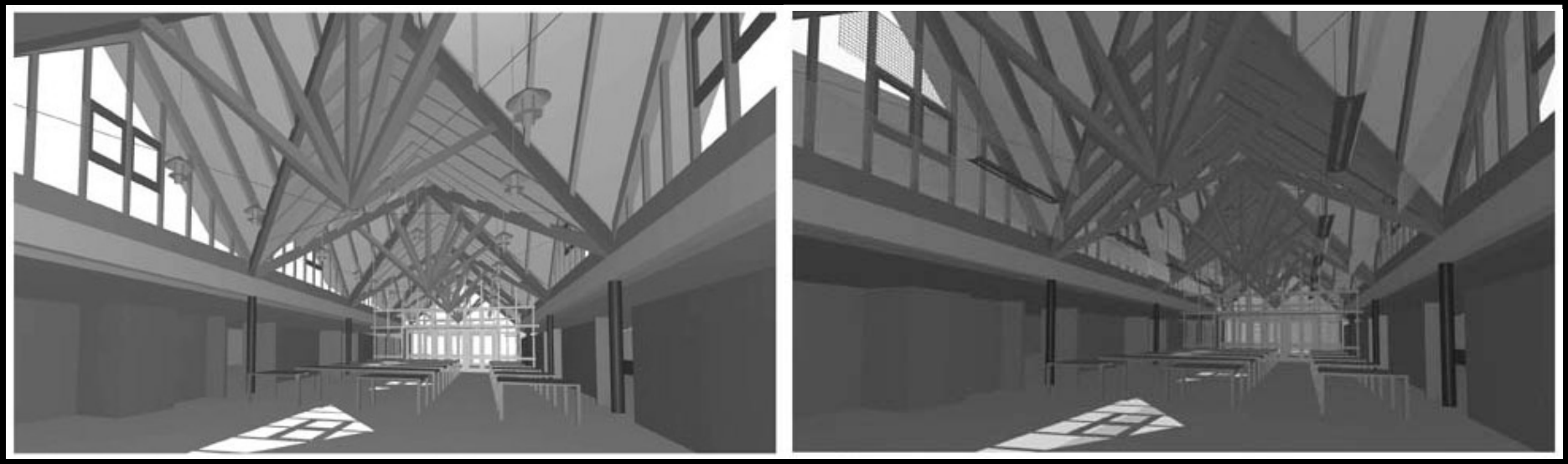
Technologies Used Daylight Harvesting



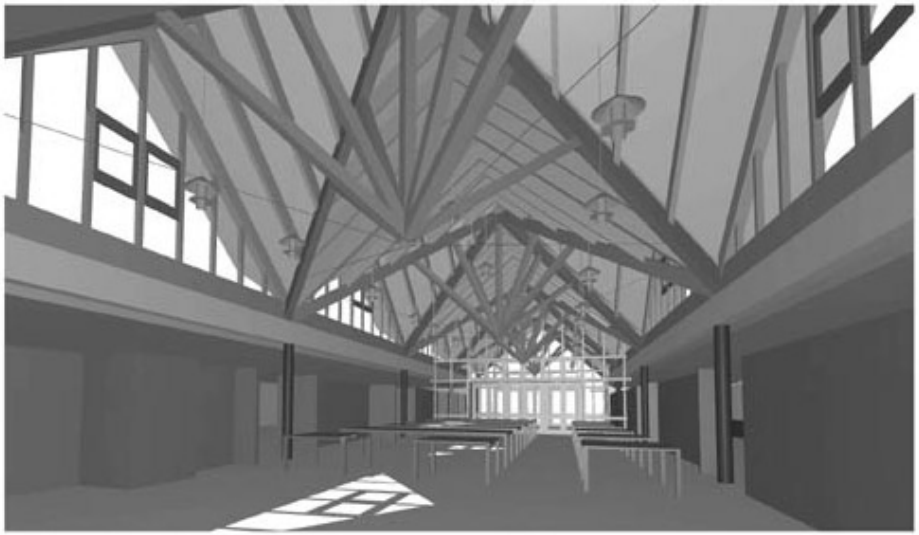
Technologies Used Daylight Harvesting

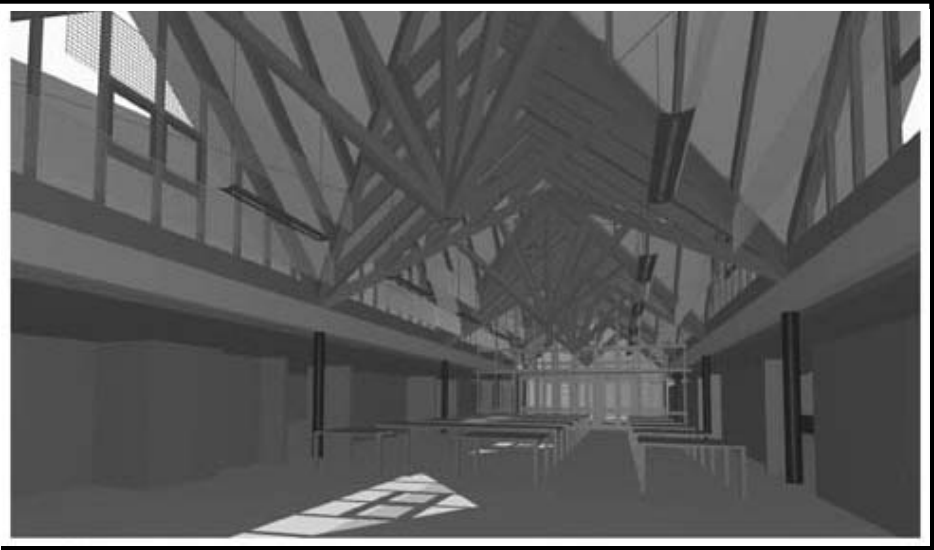


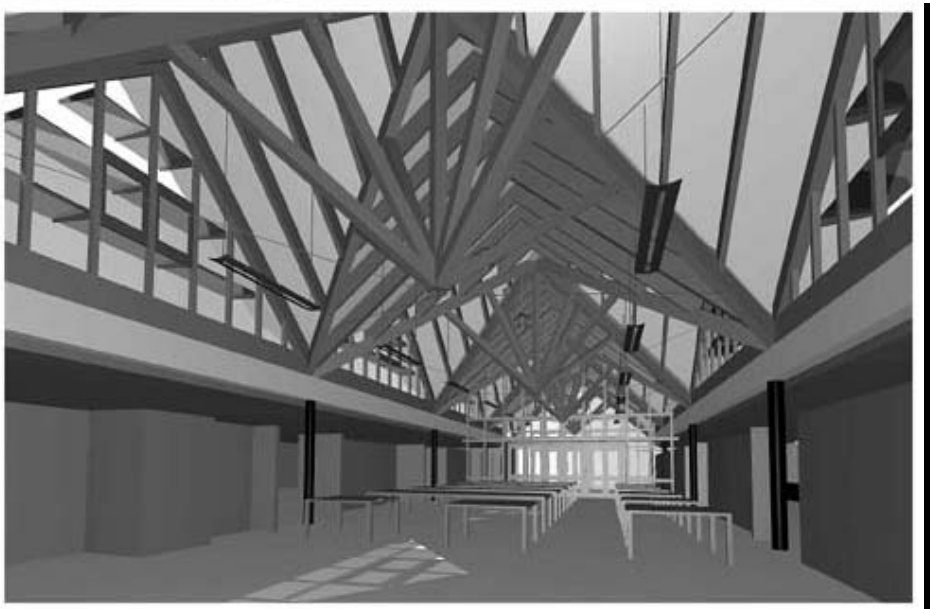
Technologies Used Daylight Harvesting



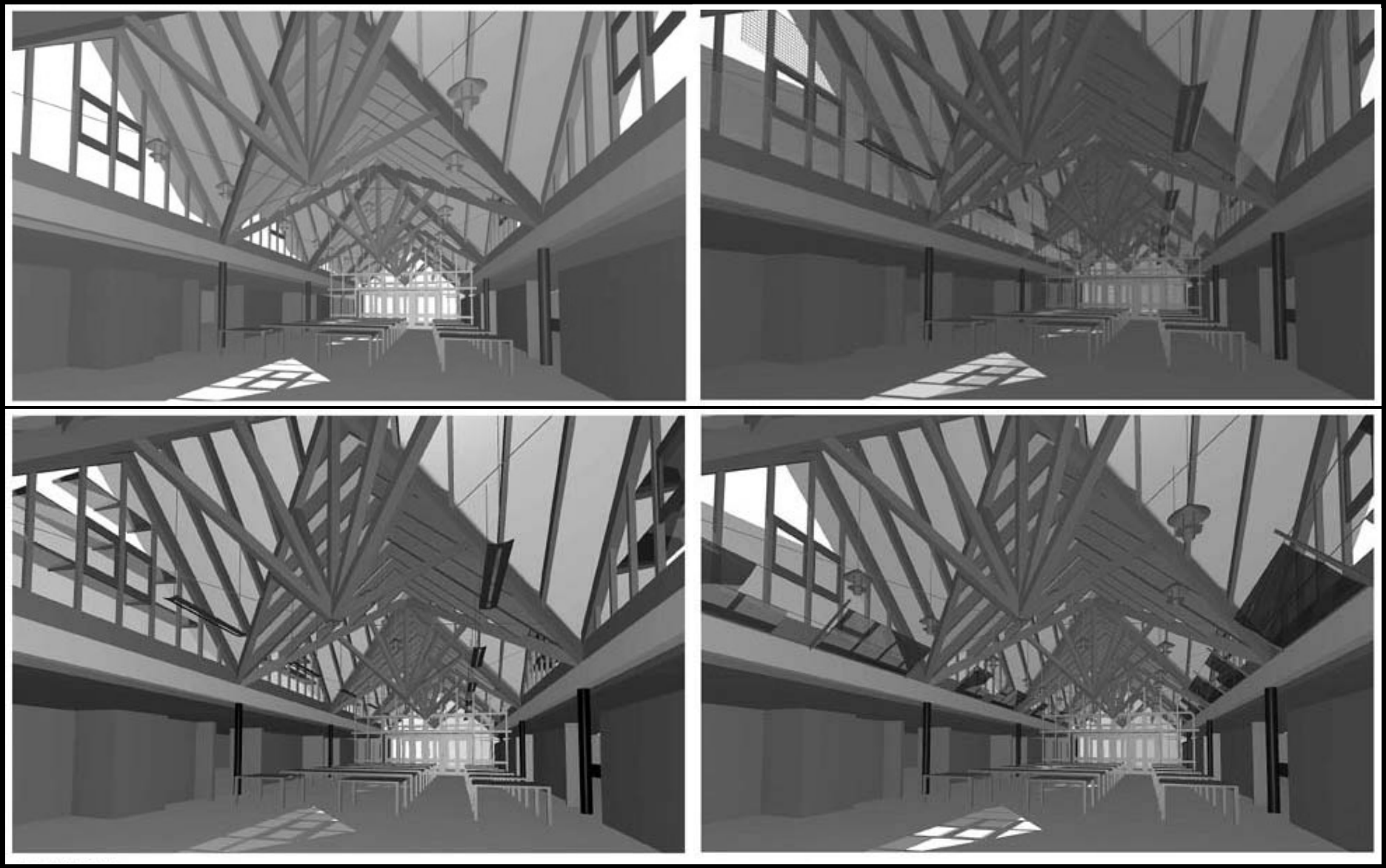
Technologies Used Daylight Harvesting



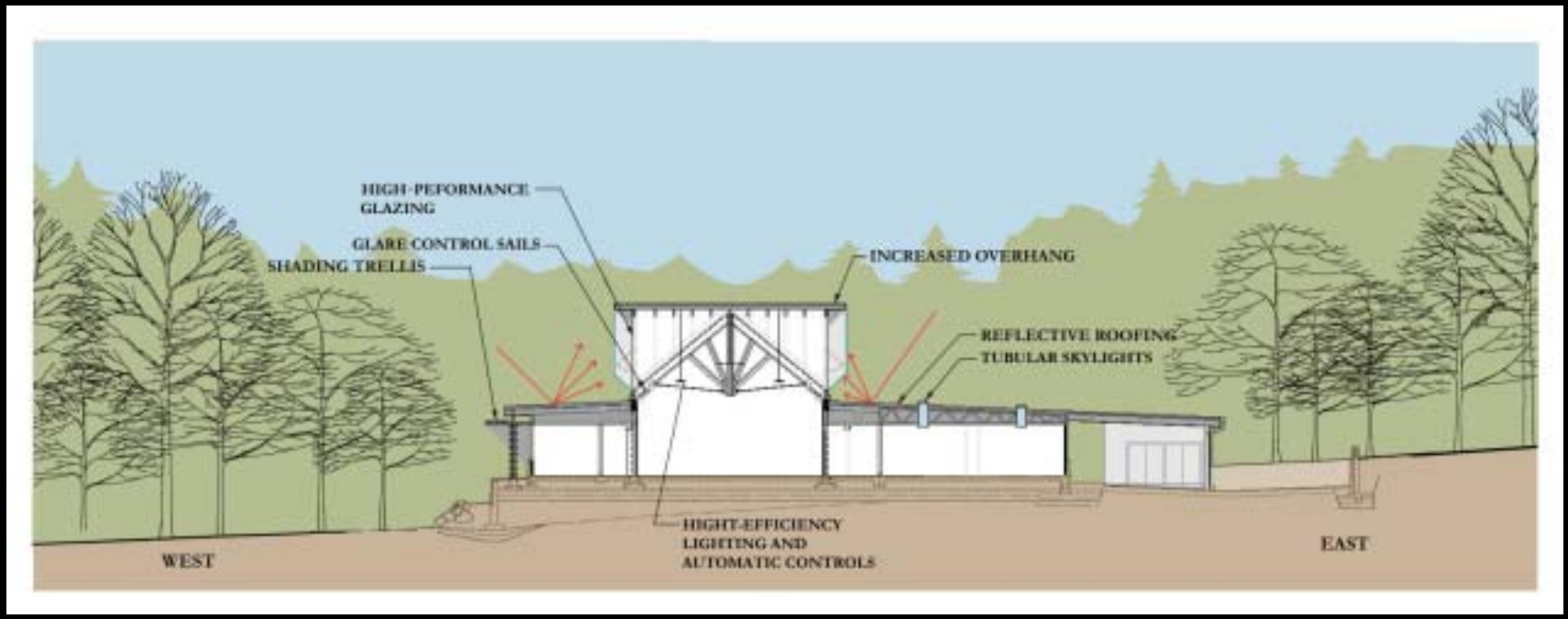




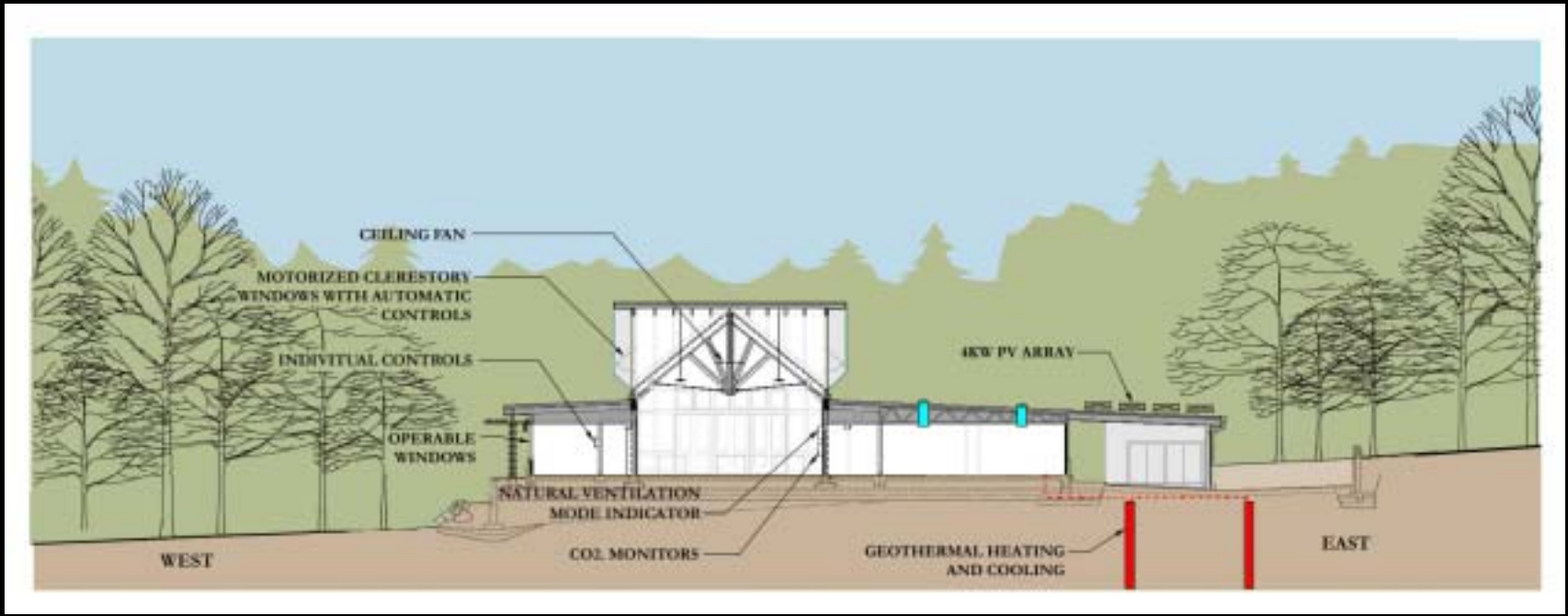
Technologies Used Daylight Harvesting



Technologies Used Daylight Harvesting

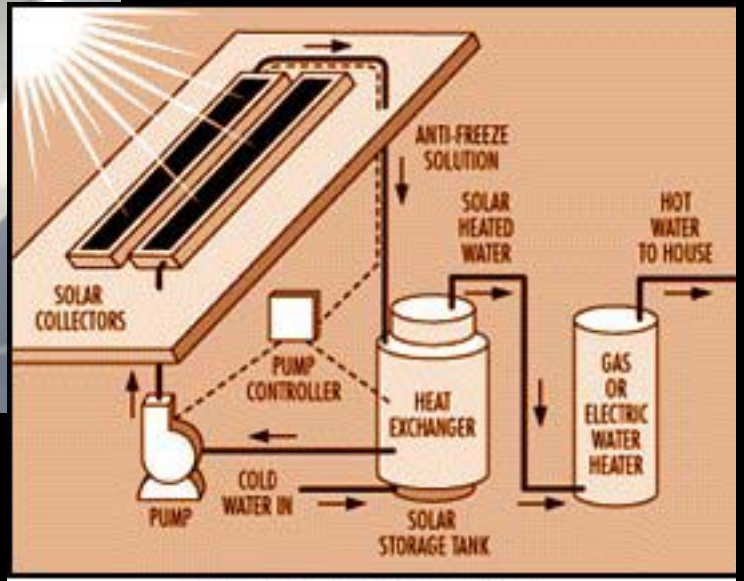


Technologies Used HVAC/Ventilation



Technologies Used

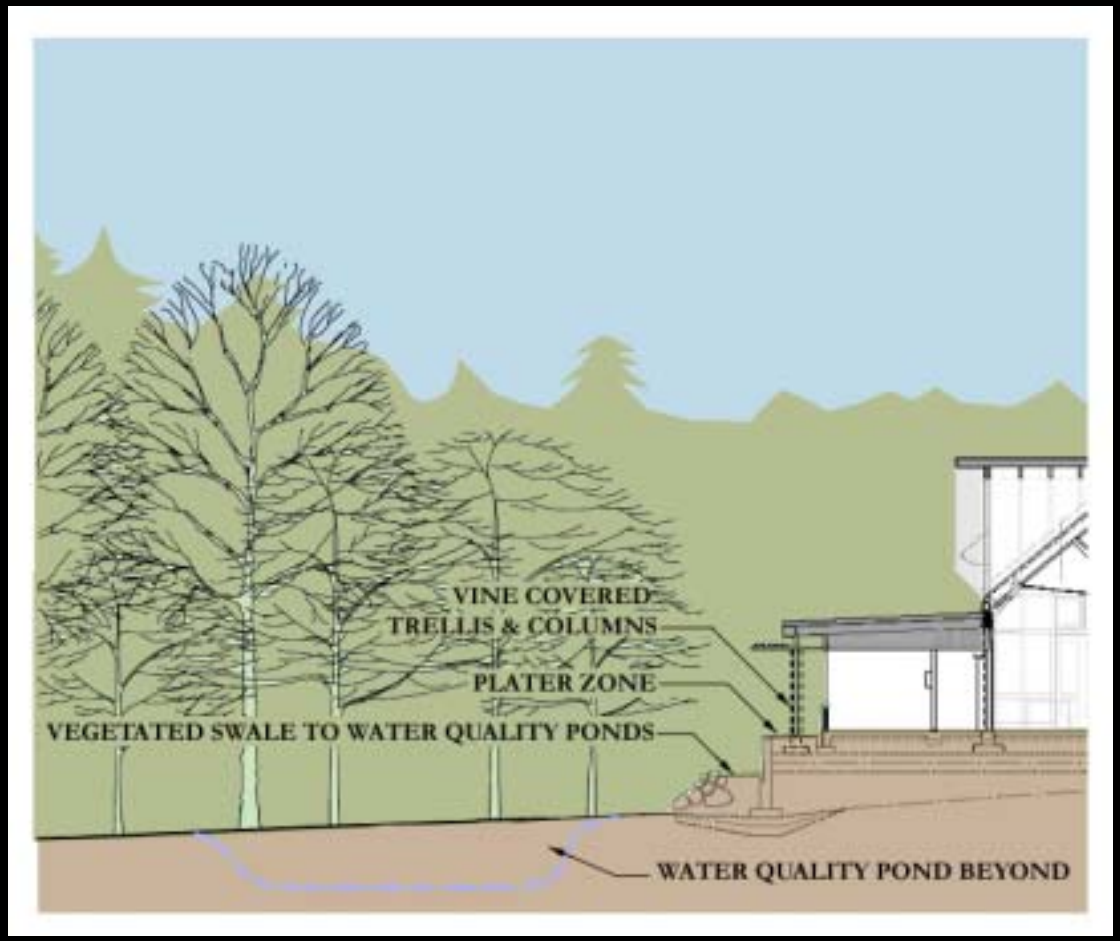
Plumbing



Solar domestic hot water

Technologies Used

Stormwater



Commissioning

ENSAR group

Great Smoky Mountains National Park

New Science Center

Preliminary Design Report

Daylighting, Electric Lighting, and Envelope Optimization

Prepared By:

ENSAR Group, Inc.
2305 Broadway
Boulder, Colorado 80304

with
Clanton Associates, and
Enermodal Engineering

Prepared For:

Lord Aeck Sargent
1200 Peachtree Street, NE, Suite 100
Atlanta, Georgia 30361-3100

November 19, 2002

ENSAR Project #0277

Twin Creeks Education and Science Center
Great Smoky Mountains National Park

16800-1
Electrical Systems Commissioning

SECTION 16800 - ELECTRICAL SYSTEMS COMMISSIONING

Twin Creeks Education and Science Center
Great Smoky Mountains National Park

15950-1
HVAC Testing, Adjusting & Balancing

SECTION 15950

HVAC TESTING, ADJUSTING & BALANCING

Twin Creeks Education and Science Center
Great Smoky Mountains National Park

16950-1
Voice and Data Cabling Systems

SECTION 16950 – VOICE AND DATA CABLING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

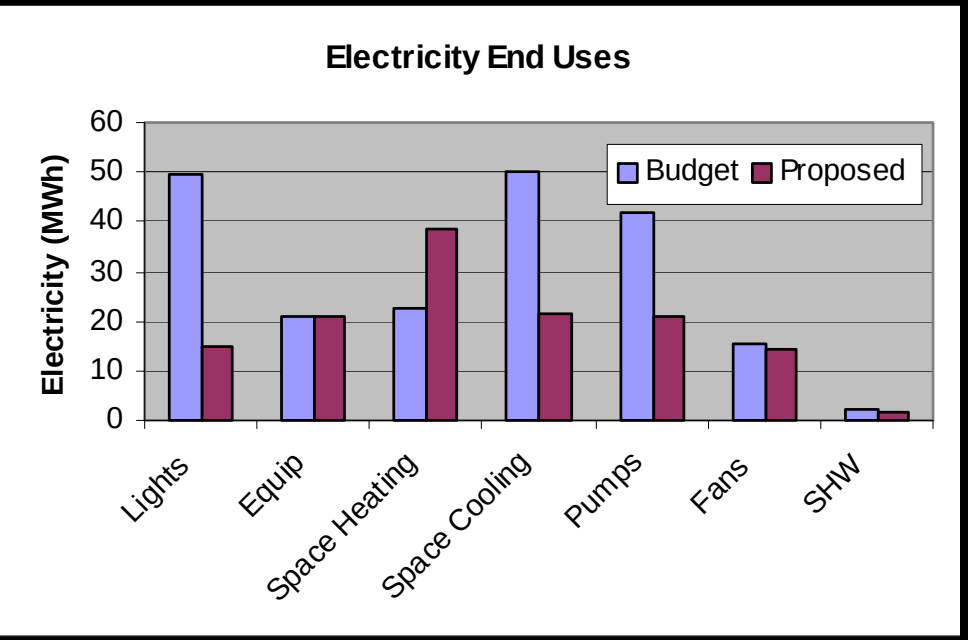
A. General provisions and other electrical systems are specified in other Sections of Division 16.

B. This Section covers voice and data cabling systems.

C. Specialty systems general provisions are specified in Section 16900, Specialty Systems General.

D. Specialty systems commissioning is specified in Section 16990, Specialty Systems Commissioning.

Measurement & Evaluation

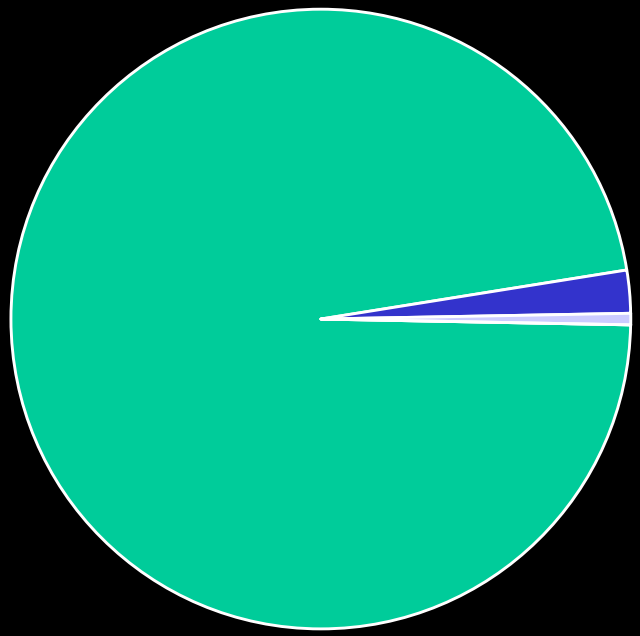


- 47 kBtu/sf Base Case
- 31 kBtu/sf Proposed
- $5,580/year savings
- 30% water use reduction

Summary

- Commitment
- Set Goals
- Quantitative Analysis
- Why Green?

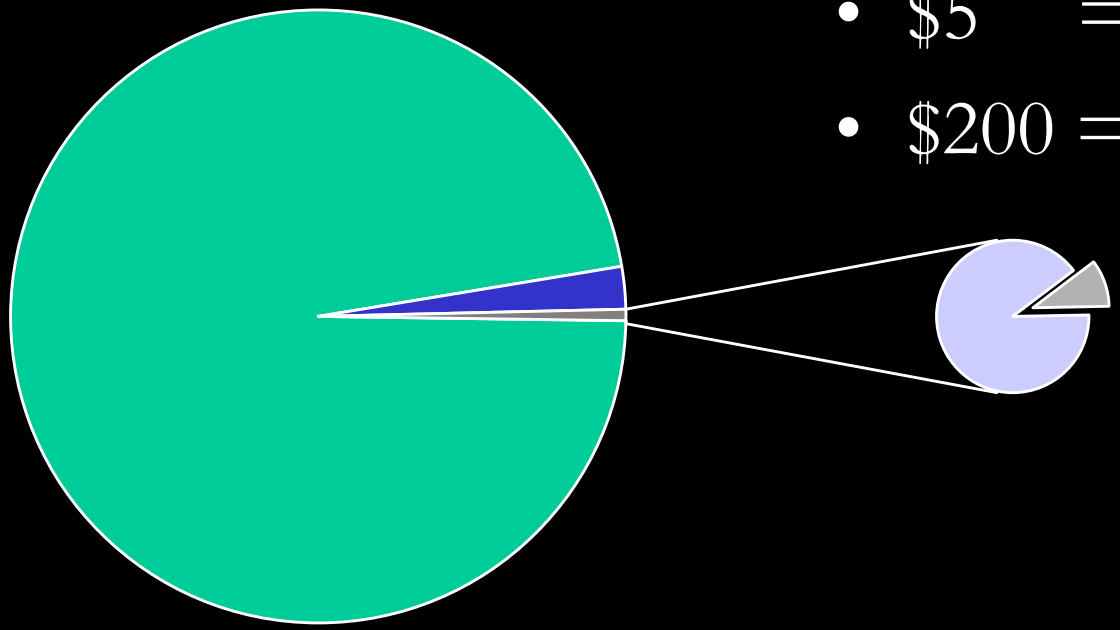
1:5:200 Rule



- $1 = Construction
- $5 = Operation
- $200 = People

1:5:200 Rule

- $0.1 = Design
- $0.9 = Construction
- $5 = Operation
- $200 = People



Questions & Answers